A NEW FOSSIL ALGA FROM THE ENGLISH SILURIAN

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ABSTRACT. A new fossil alga, *Inopinatella lawsoni* gen. et sp. nov., is described from the Upper Bringewood Beds (Aymestry Limestone), Upper Silurian. It is reminiscent of an early growth stage of the modern green alga *Neomeris* (Chlorophyta, order Dasycladales), and it may be a primitive adult non-calcified dasycladalean, with a simple structure now only seen in the early ontogeny of dasycladaceans.

THE alga which forms the subject of this paper was collected by Dr. J. D. Lawson during his investigation of the Aymestrey area and was entrusted to me for study. Although a new genus and represented by numerous examples, the material was at first sight unpromising, by reason of the simplicity of the structures preserved. However, consideration of the correct taxonomic reference of this alga has led to a surprising estimate of its possible relationships.

SYSTEMATIC PALAEONTOLOGY

Algae INCERTA SEDIS (? Order DASYCLADALES; CHLOROPHYTA)
Genus INOPINATELLA gen. nov.

Diagnosis. Non-calcified alga with long thin main stem showing regularly spaced slightly thickened levels from each of which diverge much thinner primary branches, usually four at each level. Primary branches slightly swollen immediately beyond point of junction with main stem, then thinning and extending for some distance before dividing into two or more thinner secondary branches. Reproductive structures not seen.

Type species. I. lawsoni sp. nov. Upper Silurian, Upper Bringewood Beds (Aymestry Limestone); England.

Inopinatella lawsoni sp. nov.

Plates 120, 121; text-fig. 1

Diagnosis. Inopinatella with primary and secondary branches about equal in length.

Description. The remains of this alga lie flattened on planes of parting in the rock, much as an assemblage of Recent sea-weeds might be pressed for the herbarium, but without definite orientation. The original thallus is represented by a black carbonaceous residue, cracked and friable; where this has fallen away, the smooth-surfaced impressions of stems and branches are seen in the granular rock. In an account by Ruedemann (1909, p. 201) of a somewhat similar genus similarly preserved in the American Lower Palaeozoic, *Callithamnopsis*, the longitudinal cracking of the carbonaceous filling was considered to indicate flattening of an originally hollow stem. This has not been seen

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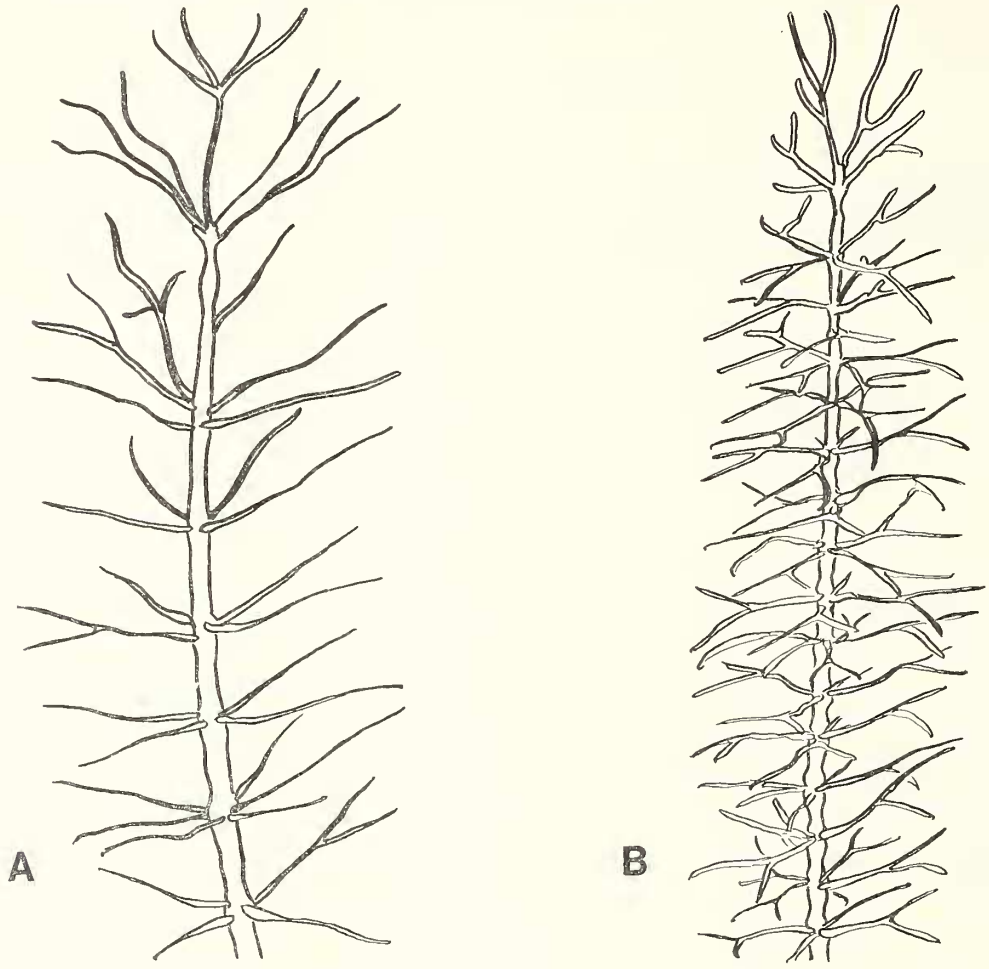
in *Inopinatella*, but one example was noted of a thin black carbonaceous-walled circular cross-section at right angles (vertical) to the plane of parting, interpreted as a cross-section of an uncrushed hollow stem. For this reason the diameters given below are probably slightly greater than those of the living plant.



TEXT-FIG. 1. A. Diagrammatic sketch of abnormal early growth-stage of living *Neomeris* sp., showing whorls with small number of unusually long side-branches, ×50 approx. Based on Valet (1968). B. Reconstruction of the Silurian *Inopinatella* as in life, for comparison with (A). Upper portion of a plant, ×10 approx.

EXPLANATION OF PLATE 120

Figs. 1–3. *Inopinatella lawsoni* gen. et sp. nov., from the Silurian Upper Bringewood Beds (Aymestry Limestone), Aymestrey, Shropshire. 1, 2. Holotype, showing main stem and primary branches ×12·5, and the basal portion enlarged ×30. Brit. Mus. (Nat. Hist.), Dept. Palaeont., Reg. no. V.31268. 3. Paratype, ×12·5. Reg. no. V.31263.

1

2

3

The main central stem of the plant is remarkably uniform. Examples lie straight, curved, or flexuous, and were originally several cm long: up to 30 mm (incomplete at both ends) has been traced. Over this length the diameter diminishes only from 0·286 mm to 0·195 mm: in another incomplete specimen of 15 mm the diminution is from 0·260 mm to 0·234 mm. The stem shows a regular swelling or slight increase of diameter at the levels from which the branches spring; these are spaced apart very regularly along most of the length at 0·390 mm apart, though closer in the terminal (distal) part of the stem. In the 15 mm example quoted the diameter of 0·260 mm increases to 0·312 mm at branch level, and the diameter of 0·234 mm similarly to 0·260 mm.

The black carbonaceous filling of the stem impressions is shrunken and cracked. Where these cracks are regularly and equidistantly transverse they give the appearance of an original plant structure, but this is an illusion as longitudinal, diagonal, and irregular cracking may also be found. In *Callithamnopsis* Ruedemann (1909) recorded transverse lines suggesting segmentation of the main stem at branch level: this has not been seen in *Inopinatella*. The point is further discussed below.

The branches lie in some confusion on the planes of parting of the rock, particularly where several individual thalli are tangled together. When their junction with the main stem can be distinguished clearly at any separate branch level, they are seen to originate in fours. Damage or tangling obscures this with many junctions, and it may be that occasionally there were more than this, but four appears to be normal. Each typical primary branch swells quickly from a small insertion on the stem-cell to a diameter of 0·156 mm and thins to 0·104 mm: at a length of about 0·7 mm they divide into two secondaries of about the same length and 0·104–0·078 or less diameter. There may sometimes have been more than two secondaries to a primary and also short tertiary branching, but I have not been able to distinguish this clearly on primaries visibly attached to a main stem.

The main stems appear to end in a terminal bunch of shorter finer branches: this is probably due to the closer spacing of branch levels with their young growing branches at the distal, growing point of the plant. In *Callithamnopsis* Whitfield (1894) considered that one specimen probably showed a terminal growing point: I have not seen this in *Inopinatella*.

No reproductive structures were found, and no recognizable holdfast was seen.

I have pleasure in dedicating this species to its discoverer, Dr. J. D. Lawson. The generic name refers to the unexpected possible relationships of the plant: *inopinatus*, *a*, *um*; that happens contrary to expectations, unexpected.

Holotype. The specimen figured in Pl. 120, figs. 1, 2, from the Upper Silurian, Upper Bringewood Beds (Aymestry Limestone), shale band several feet below *Dayia*-beds. Small quarry above road, *c*. 594 m W. 40 N. of Aymestrey Church, Shropshire, England (Map. ref. 32/421655); J. D. Lawson Coll. Brit. Mus. (Nat. Hist.), Dept. Palaeontology, Reg. no. V.31268.

Paratypes. The specimens figured in Pl. 120, fig. 3 and Pl. 121, figs. 1–3 same locality and horizon, Reg. nos. V.31256, 31262, 31263, 31278; also V.31253 not figured.

Other material. Numerous examples on rock fragments from the same sample.

COMPARISON AND AFFINITIES

Much the closest fossil alga with which *Inopinatella* may be compared is *Callithamnopsis* from the Ordovician (Trenton) of U.S.A. *Callithamnopsis fruticosa* (Hall) Whitfield was described as an alga by Whitfield (1894), and re-examined and a second